



**Benefit-Cost & Least Burden Analysis**

**for**

**Chapter 173-505 WAC**

**In-stream Resources Protection and Water**

**Resources Program**

**Stillaguamish River Basin**

**Water Resources Inventory Area (WRIA) 5**

Prepared by:

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## **Executive Summary**

Ecology has determined that the probable benefits of the rule are greater than the probable costs and that it is the least burdensome for those that are required to comply.

The Department of Ecology is adopting Chapter 173-505 WAC to set, achieve and protect in-stream flows and create a water management program for areas including the Stillaguamish River and tributaries and all contributing land area, as set forth in chapter 173-500 WAC.

- The rule closes areas during certain periods, creates reservations for domestic and stockwater uses and clarifies the requirements for out of stream uses.
- The rule sets in-stream flows that define levels needed for fish and all other in-stream values.
- The rule creates a reservation that allows residential and commercial users and municipal water suppliers to receive water that will be uninterrupted subject to certain limits.
- Future, permitted, year around, consumptive uses, which are not eligible for the reservation, may obtain water through mitigation and transfers during the closure periods
- The rule creates a new stockwatering reservation for those needing water for stock.
- Proposed transfers will be evaluated considering the in-stream flow right.
- No direct impacts to existing water right holders are anticipated.

Ecology has conducted this benefit-cost analysis as part of this rule adoption.

The rule imposes costs due to reduced availability of water for out of stream uses and due to implementation costs. Reduced availability for out of stream uses generates the largest costs: Use of water will be restricted from lakes and ponds. Low flows occur quite frequently on the river and streams depending on the time of year. During closed periods, less water will be available for permitted uses. The exact cost depends on location, frequency of proposed uses, alternatives, and the value of existing interruptible rights. For exempt well users, some outdoor watering will be allowed on up to 1/12<sup>th</sup> of an acre. Estimation of the cost of this restriction yields a range of \$3-\$35 per household-summer. Totalling this over the number of expected exempt wells yields a range of value between \$135,000 and \$1.7million through 2025. Other costs associated with lake and pond use restrictions, stream closures, connection requirements and transfers would be in addition to these costs.

The benefits of the rule include ecosystem and recreational benefits from increased water flow, improved availability and management of water for out of stream uses, risk reduction, nonuse, and public health benefits.

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## 1. INTRODUCTION

### BACKGROUND

The Washington State Department of Ecology's (Ecology) Water Resources Program is adopting Chapter 173-505 WAC. The rule creates an in-stream resources protection and a water resources program for the Stillaguamish River basin.<sup>1</sup>

- The rule closes areas during certain periods, creates reservations for domestic and stockwater uses and clarifies the requirements for out of stream uses.
- The rule sets in-stream flows that define levels needed for fish and all other in-stream values.
- The rule creates a reservation that allows residential and commercial users and municipal water suppliers to receive water that will be uninterruptible subject to certain limits.
- The rule creates a new stockwatering reservation for those needing water for stock.
- The rule states Ecology's policies to guide the protection, utilization and management of Stillaguamish River basin surface water and interrelated groundwater resources for use in future water allocation decisions.
- Proposed transfers will be evaluated considering the in-stream flow right.
- No direct impacts to existing water right holders are anticipated.

### DESCRIPTION AND PURPOSE OF THE BENEFIT-COST ANALYSIS

This benefit-cost analysis evaluates the economic efficiency of rules.<sup>2</sup> The law requires Ecology to determine whether the probable benefits of the rule are larger than the probable additional costs. RCW 34.05.328(d) further describes the requirements under the Administrative Procedures Act:

*“Determine that the probable benefits of the rule are greater than its probable costs, taking into account both the qualitative and quantitative benefits and costs and the specific directives of the statute being implemented”*

The benefit-cost analysis provided below includes quantitative information where available and qualitative information where the economic or physical science is not to the

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<sup>1</sup> The Stillaguamish River basin is designated as Water Resource Inventory Area 5 (WRIA 5) in chapter 173-500 Washington Administrative Code (WAC).

<sup>2</sup> Under the POLICY INTERPRETIVE STATEMENT, MAXIMUM NET BENEFITS FOR WATER RESOURCE ALLOCATIONS this rule is exempt from a maximum net benefits analysis because it only covers instream flows, domestic uses, and stock watering uses.

point of providing values for benefits and costs. Ecology did not evaluate the distribution of impacts to various human populations.

## 2. RULE REQUIREMENTS AND PROBABLE COSTS AND BENEFITS

### INTRODUCTION

Ecology has based the evaluation of the rule on a comparison of water right management with and without the rule. This compares current management and likely management after the effective date of the rule.

The current water right administration bases water allocation on a complex legal and administrative framework. The framework includes:

- administrative procedures for applications for both new water rights and changes to existing water rights, and the use of water by permit-exempt wells (RCW 90.44.050)
- implementation of Chapter 90.22 RCW and Chapter 90.54 RCW

This rule creates new conditions that must be considered when making future water right decisions by reserving water, and closing streams and rivers. A brief description of compliance requirements is provided below. A detailed description of water management under the current rules can be found in Appendix A.

### WATER RIGHT ADMINISTRATION UNDER THE RULE

The future water right management program closes rivers and streams, specifies in-stream flows and reserves specific quantities of groundwater in specific rivers and streams, for year-round future domestic uses of households and businesses. This rule also creates a reservation for future stockwatering and establishes eligibility conditions for use of the reservations.

### COSTS AND BENEFITS OF RULEMAKING

The rule will affect water right applicants. Existing water right holders will not be directly affected unless they apply for a transfer. The environment will be affected by increasing or decreasing out of stream water uses. Water levels may affect some recreational activities. A general description of benefits and costs associated with in-stream and out of stream uses of water is provided below.

#### Costs

The economic cost associated with this rulemaking is the loss in the value of the water in its alternative use. This may be the lost value of the water in the streams and tributaries when additional water is allowed to be withdrawn or the value of the water for out of

stream uses when it is required to remain in the streams. These can be described more specifically as follows:

#### Reduced Availability of Water for Out- of-Stream Uses

##### *Surface Water:*

##### *Lake and pond consumptive withdrawal restrictions:*

Surface withdrawals from all lakes and ponds will be limited to single in-house domestic uses not to exceed 150 gallons per day per home under the rule.

##### *Changes*

Currently, applicants would likely get a right to a larger quantity of water but they would be required to reduce use to in-house domestic use during low flow conditions in the tributary. Thus it is likely that water use will only be more restricted under the rule during normal flow periods. This may be a limitation on some applicants desiring to access these sources at all times of the year.

##### *Cost impact of changes*

The cost impact of this restriction will depend on whether more permit applications would have been submitted absent the rule, and how much more water the remaining applicants wish they had.

##### *Stream closures:*

All rivers and streams and the groundwater in continuity with them which would affect flows will be closed entirely or for certain periods of the year. Some of these are currently open to new withdrawals and some are closed. The rule includes the current limitations for surface water sources, and adds several other streams and rivers.

For applicants who cannot access the reservations, applications for consumptive uses from sources closed during certain portions of the year will be denied unless the applicant can mitigate the impacts during the closure periods or demonstrate the proposed withdrawal will not affect in-stream flows set by rule. In partially open areas, interruptible water rights may be issued.

##### *Changes*

*Streams with flows available at least part of the year:* the decision process will be much the same as prior to the rule.

- Currently, Ecology sets conditions on a water right to protect flows and grants a permit for an interruptible right.



- Under this rule, all new surface water rights will be required to stop withdrawing during the closed periods or when minimum in-stream flows are not met in the surface water source.

This may represent a significant change for future surface water permits since currently they would only be required to stop withdrawing water during low flow periods. The low flow periods of the year are shorter than the periods when minimum in-stream flows are not met.

*New consumptive surface water rights during the closure periods:* Under this rule applications would be denied, unless the applicant proposes, and Ecology accepts, mitigation of the water use or an interruptible right is acceptable to the applicant. An uninterruptible right may be approved on a case-by-case basis. Whether or not this creates a change depends largely on whether the application lies within an area covered by the Ecology's Surface Water Source Limitations (SWSL) list, about 30% of the basin

- For areas currently included in Ecology's Surface Water Source Limitations (SWSL) list, the rule would change little unless the applicant wanted to obtain water from the reservation. Appropriations from a stream listed in the SWSL are currently either denied or conditioned on low flow requirements.
- For areas that are not currently included in SWSL, this may represent a change unless the applicant wanted to obtain water from the reservation. Potential water right holders would have to cease use of water every year instead of just during the low-flow closure periods as would be the case for a conditioned right.
- Stock watering should be unaffected. In accordance with the requirements of RCW 90.22.040, Ecology is providing for future stockwatering from surface water sources and groundwater.

This will generally eliminate new permitted water withdrawals entirely or during certain periods of the year unless the use:

- fits under the reservation for domestic uses<sup>3</sup> (human needs of a household or business) and stockwatering
- is non-consumptive
- is fully mitigated during closure periods
- is from groundwater shown to not affect surface water

#### *Cost Impact of Changes*

Ineligible water uses will need to obtain water during closure periods from an existing water purveyor, through leases or transfers, or through other methods.

Water uses such as irrigation or agricultural/industrial processes may be affected. Under the rule, Ecology would probably deny future applications unless the applicant proposes mitigation, storage, an intermittent use, or a nonconsumptive use. Currently these water

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<sup>3</sup> Currently, permit-exempt well users can use up to 5,000 GPD assuming they meet the other requirements of RCW 90.44.050.

uses would probably be approved and conditioned on low flows. Thus the current growth in irrigated acreage would be reduced. The rule probably reduces the duration of time during which water for these uses would be available. The effort required for each option changes. More storage, more mitigation, more leasing, more water purchasing, or a longer period of non-use would be required. This change may increase water leasing or transfers of existing water rights or could lead to a change in the proposed location of a commercial industry or agricultural use. The magnitude of the impact will be determined by the change in productivity that results.

### ***Ground Water:***

The rule creates changes that are very similar to the surface water changes. It also provides a reservation for domestic and stock watering uses.

For much of this basin ground water is in hydraulic continuity with the surface water. The rule will affect groundwater applications if that groundwater withdrawal will impair the flow or level of the rivers and streams. The rule does not create the need for, nor does it change the standards for, the analysis regarding whether withdrawals cause impairment. Based on the hydrogeology of the basin, and the location and depth where groundwater withdrawals generally occur, future groundwater withdrawals have a high likelihood of capturing water that would result in impacts to surface water flows and levels in the Stillaguamish River Basin. Therefore, for this analysis, groundwater sources are presumed to be connected with surface waters in the rule.

### ***Changes***

The rules that apply to groundwater will change in a manner that is very similar to the surface water changes described above. Thus the costs will also be similar.

- Groundwater applications in hydraulic continuity with the rivers and streams in the Stillaguamish basin will be subject to the in-stream flows if the withdrawal of water will impair the flow or level of rivers and streams, and unless they are eligible for the domestic reservation.
- Applications for new consumptive ground water rights from sources that are closed part of the time would either be approved as interruptible rights or denied, unless the applicant proposes, and Ecology accepts, mitigation of the water use or unless the applicant shows that the withdrawals will not affect surface water. An uninterruptible right may be approved on a case-by-case basis.
- For areas currently listed under Ecology's SWSL list, this would represent no change from the current situation except for those obtaining water from the reservation.
- For those areas that are not currently listed on the SWSL this may represent a change because they would not be able to use water in areas with year-around closures and will likely be required to curtail use more frequently in those cases where closures are only part of the year.

For wells in areas that are not in hydraulic continuity, applicants could hire a hydrogeologist. The hydrogeologist may certify that a well would not cause impairment of a water right in areas where hydraulic continuity between the surface water and groundwater is not likely. Ecology would have to approve this certification. This would allow an applicant to develop a well as though the rule was not in place, but at the additional cost of the analysis. For some wells in basins which drain groundwater to saltwater bodies, this cost would likely be very small.

#### *Creation of the reservations:*

A reservation of ground water for future domestic uses provides a management framework for permit exempt groundwater withdrawals. Ecology expects the reservation to be sufficient for these uses for at least the next 20 years. Under the reservation, domestic uses will be allowed year around. Current standards on domestic water use efficiency will still apply. For businesses that would typically use a relatively small amount of process water (up to 5,000 GPD), an interruptible right would still be available during open periods in some areas. Businesses can also meet their domestic needs from the reservation. For stockwater, Ecology is reserving groundwater, to allow for growth in the number of animals over the next 20 years.<sup>4</sup>

#### *Changes*

Permit exempt wells can currently be drilled in all areas.

Under the rule, the reservation will be available for these permit exempt wells.

- In areas where the appropriate city(ies) or counties submit a written acknowledgment to the department that confirms that any legally required determinations of adequate potable water for building permits and subdivision approvals will be consistent with applicable provisions of this chapter. The analysis below assumes the local governments act to make the reservations available within their jurisdictions.<sup>5</sup>
- Applicants can only receive water from the reservation if water is not available from a municipal water supplier.
- The rule restricts domestic outdoor use to irrigation of 1/12<sup>th</sup> of an acre.

For those interested in using a permit exempt well, there would be several alternatives. For wells that would be drilled in areas in hydraulic continuity with closed basins or with streams subject to in-stream flows where impairment would result, options include:

- obtaining water from the reservation

<sup>4</sup> 20 acre feet of stock water is enough water for about 1450 – 1500 animal units, about a 30 percent increase in basin stock assuming all stock used ground water. The surface water, stockwater reservation created as prescribed by RCW 90.22.040 is an instantaneous reservation, with no annual quantity of water. It is an in-stream stockwater right. The ground water reservation of water, twenty acre-feet, is for the future stockwater needs not satisfied by the use of surface water. The reservation is not sized nor intended to meet all stockwater needs. Numerous water rights and claims to water rights for stockwatering exist in the basin. Numerous existing wells drilled under the permit exemption are used for stockwatering.

<sup>5</sup> Appendix C discusses the case where action is not taken.

- accepting an interruptible water right in partially closed basins
- providing storage
- mitigating the impacts.

#### *Cost Impact of Changes*

The limitations on the reservation may impose costs on applicants who would have qualified for a permit exempt well in the absence of the rule.

- Some exempt well applicants may have to hook up to a municipal water supplier rather than drilling a well.<sup>6</sup>
- Both individuals and businesses doing residential construction or requiring domestic water only, can meet their needs through the reservation. However, the rule restricts domestic outdoor use to irrigation of 1/12<sup>th</sup> of an acre.

#### *Transfers*

Water transfers will still be allowed, however, they may be affected by the new water rights created by the rule.

#### *Changes*

Applicants can change or transfer existing water rights as permitted by Chapters 90.03 and 90.44 RCW.

- Currently, changes for surface water rights cannot consider impairment of in-stream flows since there is no in-stream flow right.
- The rule will make in-stream flow impairment analysis a consideration in a proposed transfer. In-stream flows will also be considered when reviewing changes in the point of diversion from a surface point to a ground water source or transfers that are restricted within the same source.

#### *Cost Impact of Changes*

Those water right transfers which may have been granted before the rule even though they had an impact on in-stream flows will no longer be allowed. This may be a cost for those that would have preferred to trade water. However, only two transfers for small quantities have been recorded previously. Transfers of water rights may become part of mitigation strategies used by businesses to offset the impacts of their new water needs.

#### *Ecosystem Goods and Services*

Canyon and Pilchuck Creeks will be opened up to new uses during some portions of the year. This could potentially impact these creeks in terms of reducing flows during some periods of the year relative to the case where no rule is in place and the creeks are still on the SWSL.

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<sup>6</sup> However, the Skagit County Critical Areas Ordinance requires connections under specific conditions.

### *Implementation Costs*

The rule will involve some implementation costs. These include the costs associated with providing technical and educational information for rule compliance, the costs associated with counties completing implementation agreements, and the costs associated with Ecology managing and accounting for the reservation.

### **Benefits**

The benefits associated with the rule are associated with the value of water in its proposed use. This includes the following:

#### Ecosystem Goods and Services

There will be some ecosystem benefits associated with lake and pond consumptive withdrawal restrictions, stream closures, reservation use and connection requirements, improved management during low flow events, reduced likelihood of over-appropriation and the ability to restrict transfers based on in-stream flows. These requirements will likely result in more water in the rivers and streams than would have been the case without the rule. Connection requirements might reduce impacts to locally sensitive streams. An avoided reduction of in-stream flow in tributaries could yield an avoided reduction in habitat for fish and other marine and avian life and avoid a reduction in the river's ability to assimilate waste. This could be a benefit for any entities relying on the river for waste assimilation, or for biological processes as well as benefit adjacent property owners.

Conditioned water rights are required to cease use of river water based on their priority date. This involves significant administrative costs in determining the order that water rights should eliminate use during low flow conditions, contacting the users, delay in determining if flows are attained after initial actions and then subsequent contacts. Moreover, water rights have sometimes been conditioned on different flow levels making administration even more difficult. An in-stream flow right created by the rule will require that all junior rights eliminate use during periods when in-stream flows are not met, increasing the likelihood that in-stream flows and therefore ecosystem services are protected.

The rule also codifies the quantity of water available for allocations, maximum flows available for interruptible uses and open and closed periods. These were based on significant analysis of existing hydrology, biology, etc. Placing these values in rule will reduce piecemeal permit by permit management of water resources and help ensure that water is not over-appropriated in the future.

#### Recreation Benefits

There may be some recreational benefits associated with stream closures and from connection requirements. These requirements will likely retain more water in the rivers than would have been the case without the rule. Connection requirements might reduce impacts to locally sensitive streams. An avoided reduction of in-stream flow in tributaries could yield a beneficial impact to rafters, those who canoe, fishing quality, and riverside

activities. Maximum allocation limits could theoretically benefit in-stream uses if they become binding.

#### Benefits to Out-of-Stream Water Use

*(a.) Benefits to existing permits conditioned on in-stream flows:* Existing holders of interruptible permits must curtail withdrawals when in-stream flows are not being met in the rivers and tributaries. To the extent that the rule decreases the rate of withdrawal of in-stream waters, this could reduce the frequency that existing rights would have to curtail use relative to the case with no rule in place.

*(b.) Increasing potential availability of water:* Ecology is proposing to allow withdrawals from Canyon and Pilchuck creeks during certain periods of the year. Currently, withdrawals from these creeks would be denied. Pending water applications benefit from the action to allow seasonal withdrawals. These changes should result in a benefit to any proposed uses from these water bodies or groundwater in hydraulic continuity with these water bodies.

*(c.) Stockwatering:* The creation of the stockwatering reservation will provide year-around access to water for stockwatering. Currently, water accessed via permit is likely to be conditioned on in-stream flows. The reserve could be a benefit to those households or businesses that are involved in managing stock and that require water in quantities that require a permit.

*(d.) Increased Certainty and Clarity in the Water Allocation Process:* The rule should reduce or the delay uncertainty surrounding obtaining new water rights. This will allow developers to plan ahead in property development and create greater value from investment opportunities. The rule may also improve clarity and provide a more certain and expedited permitting process.

#### (e.) Improved Water Management Structure

The rule includes provisions that will encourage local governments to jointly implement water management in the basin. This should lead to a less contentious and more holistic approach to water management and land use that may lead future land development to better account for water and water related impacts.

#### Risk, Uncertainty and Water Rights

There is a significant amount of uncertainty associated with water use and in-stream flows. Future studies may determine that more or less water should be maintained in the river. However, a water right is a firm commitment to provide water in perpetuity. By restricting permit-exempt use, withdrawals from lakes and ponds and closing streams, the ability to maintain flows in the river is strengthened, in case fish stocks are significantly affected by even small incremental withdrawals and/or subsequent information indicates this is the highest and best use.

#### Non-Use Values

Non-use values such as spiritual and existence values could be impacted as part of this rulemaking. These values do not derive either from direct or potential use of water resources in the basin, and represent a different category of value than the use values listed above.

Public Health Benefits

The Washington State Department of Health (WSDOH) has indicated that having many individual wells in any given area increases the risk of groundwater contamination. Requiring entities within municipal water supplier service areas to connect will reduce this increased risk of contamination.

### 3. ESTIMATED COSTS AND BENEFITS

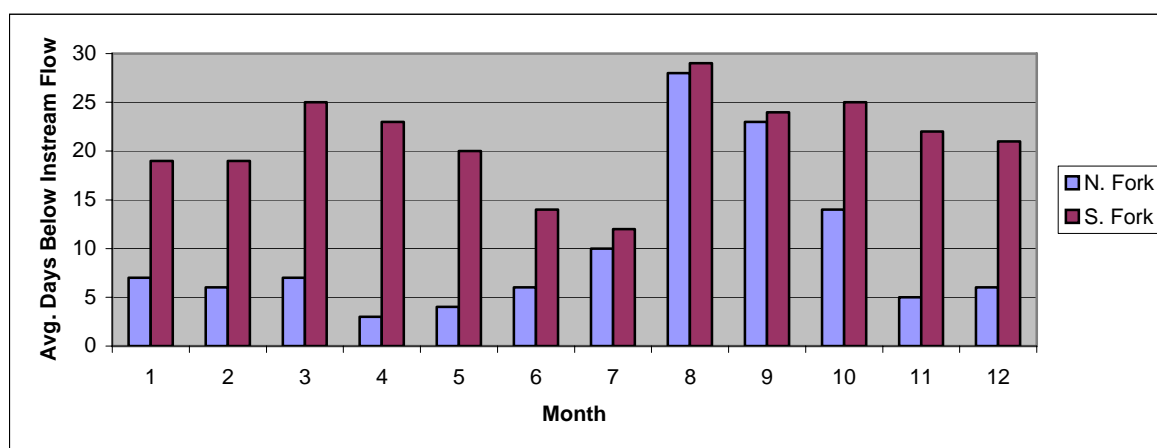
#### INTRODUCTION

The analysis provided below describes the estimated costs and benefits of the rule. Though it is possible to get a quantitative estimate of some of the costs and benefits, in most cases it is difficult to develop quantitative estimates for each cost and benefit. In those cases, only qualitative conclusions are provided.

#### RECURRENCE FREQUENCY

Some of the impacts of the rule will occur during periods when low flows are not met in the river or its tributaries. For example, the impacts of closing streams during certain periods of the year are dependent on how often low flows would occur in those rivers without the rule and therefore, how often an interruptible right would have been required to limit use. As such, an important part of the analysis of impacts is in determining how often low flows are likely to occur in the future. This is a function of the future flows in the river and the minimum in-stream flow levels in the rule.

To assess the frequency of low flows, historical data was obtained for two locations along the North and South Forks of the Stillaguamish River.<sup>7</sup> These past flow values were compared with the in-stream flow values and used to determine how frequently minimum flows would not have been obtained in the past if the in-stream flows had been in effect. These historical flows provide a relatively long time series. They provide a reasonable approximation of the number of times that future minimum in-stream flows won't likely be met.<sup>8</sup> Figure 3.1 indicates the results.



**Figure 3.1. Average Number of Days Historical Flows Would Have Been Below Minimum In-Stream Flows in WAC 173-505<sup>9</sup>**

<sup>7</sup> Flow data was obtained for USGS #12167000, North Fork Stillaguamish @ RM 6.5 and USGS #12161000, South Fork Stillaguamish @ RM 34.9.

<sup>8</sup> If climate change impacts lead to drier summers as some forecast, then it may be an underestimate of the impacts. However, it is difficult to say how quickly climate change impacts may occur.

<sup>9</sup> Data for North Fork (RM 6.5) from 1928-2002 and for South Fork (RM 34.9) from 1928-1980. Analysis utilized 90% of the proposed in-stream flow to account for measurement error.



As can be seen, there appears to be a difference in the frequency minimum in-stream flows would not be attained in the two forks. In the north fork, flows are attained for most of the days in an average year except late summer and early fall. In the south fork, flows are not attained more than half the time during all months except for two and minimum flows also appear to not be attained most frequently in late summer and early fall. On average, in-stream flows are not met over 90% of the time in August for both forks. The data utilized to develop the graph above are average flows and it appears that for the winter months, the number of days where minimum flows is not attained is more likely to be associated with extended periods of low flows in specific years rather than with the same number of low flow days every year.

## IMPACTS TO WATER RESOURCES

The rule will result in some water that will not be used during certain periods via lake and pond restrictions, stream closures and restrictions on exempt well uses. In general, it is possible to estimate some of these impacts given expectations about exempt well use and permitted surface and groundwater uses.

Lake and pond withdrawals from surface water will be limited for each home to 150 gallons per day for in-house use.<sup>10</sup> Given estimated outdoor use of between 31,200 and 51,700 gallons per year,<sup>11</sup> the amount of water saved per connection would likely be 0.0001-0.0002 CFS. It is difficult to forecast how many connections would have occurred absent the rule. Since 1985, 32 surface water permits have been issued for all uses including streams, lakes and ponds and all have been issued to individuals. Given the values listed above, it would appear the impacts as measured in volume of water would be relatively small.

The impact of stream closures on streams that are currently open is that during all or some periods of the year no use will occur. Under the current management scenario, use would only be restricted during low flow periods which may not occur every year in some sources. Canyon Creek, Pilchuck Creek and several unnamed streams are currently recommended for permit denial on the SWSL and so opening these creeks during some periods of the year could result in reduced flows in the creeks.

In general, the closure periods extend over the periods when low flows are least often attained.<sup>12</sup> Permit holders would still be required to eliminate withdrawals during the open periods if minimum in-stream flows are not met. The change could then be estimated by considering the average number of days that eliminating withdrawals will be required during an average closure period. Table 3.1 provides an analysis.

<sup>10</sup> AWWA (1999) found an average indoor use value for Seattle households of 57.1 gallons per capita per day. Using 2.55 persons per household yields an indoor use of 145.6 gallons per household per day.

<sup>11</sup> See Appendix C for an analysis

<sup>12</sup> Most of the closures are from June to October or November. Squire Creek is only open November through February and May through June.

**Table 3.1. Comparison of Average Number of Days Curtailment Would be Required under Existing Program and Under the Closure for N. & S. Forks of the Stillaguamish River.**

	<b>Average No. of Days Use is to be Curtailed due to Low Flows</b>	<b>Closure Period (Assumed to be July 1-Oct. 31)</b>
North Fork	75	123
South Fork	90	123

As can be seen, the difference in the average number of days that closure will require users to curtail use is between 33 and 48 days. The exact quantity of additional water that will remain in the river due to this change will depend on the allowed use, quantity, climate, etc., and the impacts of those sources that will be newly opened for withdrawals. Since 1985, 84 permits have been issued for groundwater and surface water sources in the Stillaguamish basin for an average instantaneous withdrawal of 0.16 CFS. This represents a permit issuance rate of approximately four permits per year.

Exempt wells that access the reservation will be able to obtain water during low flow periods but will be restricted in the use of outdoor water. Determining the number of exempt wells likely to be developed in the next 20 years was performed by analyzing land use in the counties and projections for population growth. Population growth in the unincorporated areas is projected to grow at a pace relatively consistent with the past. The population growth in the unincorporated areas was allocated to the watershed based on the forecast of population growth by OFM and the Puget Sound Regional Council. Growth in water resource demand that occurs within the Urban Growth Areas (UGAs) was assumed to be provided by the local purveyors. Growth that occurred in the unincorporated areas that is currently served by a public water system was assumed to be served by an exempt well.<sup>13</sup> Estimation of permit-exempt well use based on estimated population growth for the WRIA indicate that between 5,500 and 6,000 new exempt wells may be installed through 2025.<sup>14</sup> Assuming an average reduction in outdoor use of between 9,400 and 30,000 gallons per year<sup>15</sup> yields an avoided use of between 0.2 and 0.76 CFS by 2025. It is important to note that the average August flowrate for the north fork of the Stillaguamish River is 462 CFS and for the south fork is 299 CFS. Therefore the estimated reduced amount of water extracted from the watershed from restrictions on exempt well use would be between 0.04% and 0.2%.

## **COST ESTIMATION**

### **Reduced Availability of Water for Out-of-Stream Uses**

*(a). Lake and pond consumptive withdrawal restrictions:* Restricting water use to 150 gallons per day is likely to significantly reduce outdoor uses. On average, the volume of

<sup>13</sup> This was assumed to be conservative and to reflect areas in the unincorporated counties that are located within the service areas of Municipal water supplier systems, but which have no infrastructure in place that can be connected.

<sup>14</sup> Existing population determined using U.S. census data in individual census blocks. Population estimates taken from Puget Sound Regional Council (PSRC) Growth Projections. Well logs indicate well drilling rates averaging approximately 230 wells per year have occurred in the past.

<sup>15</sup> See Appendix C for analysis.

water unavailable is likely to be between 31,200 and 51,700 gallons per year that will no longer be available for use. Ecology has developed a model to consider the impacts of reduced outdoor water use and it is described in Appendix C. It is estimated that on average, this reduction in desired outdoor water use would result in an impact to users of between \$58 and \$244 per year. Unfortunately it is difficult to determine how many surface water applications can be expected in the future. As mentioned previously, 32 surface water rights have been issued since 1985, but this includes all surface water uses. Based on this number it seems reasonable to conclude that the impacts will be relatively moderate.

*(b.) Stream closures:* Stream closures might affect permitted uses depending on the surface water source. The impact will likely be a requirement to fully mitigate or purchase water for completely closed basins or an increase in the number of days that water use must be curtailed or mitigated for in some sources. Offsetting this will be an increased amount of water available from some sources that would currently not be available. In most cases, future applicants for surface water or groundwater in continuity with surface water bodies would have to expect that they would get an interruptible right under the existing management structure. Therefore, most applicants would either accept an interruptible right because it meets their needs or were planning to purchase or lease other water or perhaps construct storage to provide for their needs during low flow periods. For areas completely closed under the rule, this requirement will eliminate new withdrawals unless non-consumptive, and new water uses will be required to obtain water from an existing water purveyor, through transfers or other methods.

Therefore, the impact of this rule provision in partially closed areas would be the value of the water that will not be available during closed periods that would have been available without the rule. This is likely to be very specific to a given applicant's water needs, the surface water body and climate. Of the 84 permits issued since 1985, 78 have been issued for single or group domestic uses and 2 for irrigation. If the rate and purposes were to continue in the future, domestic uses would be able to access water from the reservation or water can be obtained from lakes and ponds as described above. For those uses that are not eligible for the reservation, it maybe more significant. Storage is likely to be too costly of an alternative to users of this quantity of water. As such, irrigators and others that need water during these low flow periods are likely to purchase or lease water and will likely increase their purchases as required to meet their needs. Given the flows above and the additional days listed in Table 3.1, we could expect that between 2.4 and 3.5 million gallons would be required. This equates to between 7.4 and 10.8 acre-ft. Water for agricultural purposes typically has values of between \$40 and \$120 per acre-ft<sup>16</sup> and so the total impact would likely be between \$300 and \$1,300 per year per user on average.

*(c.) Reservation creation:* The rule restricts the outdoor use of water to 1/12<sup>th</sup> of an acre for an individual well from the reservation. Not being allowed to use unlimited amounts of water outdoors will mean that some consumers will not be able to wash cars, utilize outdoor pools, and water lawns or have extensive landscaping. To determine the cost

<sup>16</sup> Based on Columbia River Basin Project for Water from "Economics of the Columbia River Initiative."

impacts of the rule ultimately involved determining the value of the water that would no longer be available for outdoor use. Detailed data on end use consumption of water is difficult to obtain, but an analysis was performed and is included in Appendix C. The analysis revealed that assuming the best available estimates of water use, yields a cost impact from outdoor restrictions of between \$3.00 to \$35.00 per well per year.

As mentioned previously, the total number of exempt wells forecast to be installed through 2025 is between 5,500 and 6,000. This amounts to a rate of approximately 275-300 wells per year which is a higher than the rate of exempt well development in the recent past.<sup>17</sup> Utilizing the cost impact values per well listed above leads to a range of cost impacts of between \$135,000 and \$1.7 million.<sup>18</sup>

#### (d.) Connection Requirements

Some entities that currently would be allowed to install a permit-exempt well will now be required to connect to a municipal water supplier's system if it is available. Currently, well installation costs range from \$5,000 to \$10,000 depending on the depth, geology, etc. Connection to a water system is estimated to range between \$8,000 and \$35,000 depending on the connection requirements. However, there are often provisions to recover a significant portion (perhaps all) of the cost via latecomer agreements. As such, it is not unreasonable to believe, that connecting to an existing system is already a cost-effective alternative for some parties. Also, Skagit County's critical areas ordinance already requires connections under certain circumstances. Therefore, for some users this may not represent a significant change. It seems reasonable to conclude that this will not represent a significant cost associated with the rule.

#### (e.) Transfers

As mentioned previously, surface water transfers that involve relocating the point of origin could be restricted once an in-stream flow rule is in place. The in-stream flow would create a water right that would allow Ecology to deny a transfer if it adversely affects flows. To assess the impact of this requirement, historical surface water right transfers were evaluated for the watershed and it was found that only two water rights had been transferred in the past. One was a change in the purpose of the use (i.e. not the location) and one was for a small non-consumptive use (0.25 CFS) from an unnamed stream. Increasing water scarcity might lead to more proposed transfers, but they may not have been affected by in-stream flows even without the rule. It is anticipated that this will not be a significant impact.

#### Implementation Costs

The rulemaking will involve additional costs including Ecology staff time in preparing technical and educational documents associated with compliance, notifying local governments and accounting for the reservation. The cost for staff, materials and processing is likely to be approximately \$3,000 for the educational materials. Accounting

<sup>17</sup> The average annual number of well logs from 1986 to 2003 is approximately 246 per year.

<sup>18</sup> Calculations assume a real interest rate of 2.7%. This estimate may over-state the cost, since it assumes that preferences for outdoor watering don't change over time.

for the reservation will also involve increased costs for Ecology employees. There will also be a cost associated with the counties processing an implementation agreement.

## **BENEFIT ESTIMATION**

### Ecosystem Goods and Services

The environment provides several services required by fish and wildlife and directly or indirectly beneficial to humans. A significant service in the Stillaguamish basin is habitat for salmon, although the waters also provide habitat for other fish, birds that prey on aquatic life, and other aquatic creatures. In addition, the river also provides dilution benefits for discharges of wastewater and stormwater. The rule will likely enhance the services provided by the river and its tributaries by retaining more water in the streams, lakes and rivers than would have been the case without the rule. This occurs by retaining flows within surface water bodies in the watershed that would have otherwise been used by permitted and permit-exempt uses. The exact quantity that will remain in the river during low flow periods will depend on the number, use and quantity of uses that would have occurred without the rule and the degree of continuity between the surface waters and groundwater wells. As indicated previously, the estimated quantity of water that would remain in the river due to exempt well restrictions (assuming continuity) relative to a case with no rule increases over time reaching between 0.2 and 0.8 CFS by 2025. This is an underestimate of the total contribution since it does not include the other savings for lakes and ponds, and permitted uses.

Fish stocks were considered in the development of the 2004 Stillaguamish Lead Entity Strategy (SLES). The fish stocks present in the river basin include Chinook, Coho, Chum, Pink and Sockeye salmon, steelhead, bull and Sea-run Cutthroat Trout. The SLES prioritizes Chinook salmon for conservation since it is listed as threatened under the Endangered Species Act (ESA). Chinook salmon spawn from mid-August to October in the mainstem, North Fork and South Fork of the river. Pink and Sockeye also spawn in the summer and chum, steelhead and trout species often spend some portion of their life-cycle in the river during the summer months.

Depending on the species, avoiding a reduction in flow will likely improve the habitat for both spawning and rearing. Avoided flow reductions will reduce the effect of temperature, provide greater estuarine and floodplain habitat, help reduce the amount of fine sediment, and improve fish passage. The SLES notes that “adequate minimum flows are also essential for spawning migration” and that “Flow, substrate condition and redd depth appear to be important factors in incubation and emergence success.”<sup>19</sup>

In general, it is very difficult given current modeling techniques to quantify the impacts of a small change in habitat on fish populations. There are many factors that affect fish populations of which streamflows are only one. Fish survival depends on flows, temperature, water quality, location of snags, ocean predation, climatic cycles, commercial fishing, etc. Most of these factors are difficult to predict with a sufficient degree of confidence. Therefore, Ecology has not attempted to quantify the benefits of a

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<sup>19</sup> 2004 Stillaguamish Lead Entity Strategy

reduced rate of flow reduction on fish populations in WRIA 5. In general, Ecology believes that the small increase in flows associated with decreased out of stream uses may result in a small increase in fish habitat during infrequent low flow events, but is unlikely to have significant impacts on fish populations. The effect of avoiding a habitat reduction on other species may be beneficial both directly and indirectly through predator-prey relationships. However, no quantifiable data is known to be available.

A potentially significant impact of this rule is the ability to restrict transfers that impair flows. Currently, proposed transfers that might impact fish stocks cannot be denied based on in-stream flow concerns since there is no water right associated with those flows. A proposed transfer that will not impair any senior rights and meets the other requirements but might significantly reduce the in-stream flows could not be denied. Though, only two transfers have occurred in the basin in the recent past, the incentive for transfers increases with increasing water scarcity. It is possible that some of the larger water right holders in the area would be willing to transfer their rights to other parties requiring a change in place of use. These larger transfers could have significant effects. Consumptive surface water rights on the north and south forks amount to 26.43 CFS and 7.64 CFS respectively. In addition, 56.4 CFS in consumptive groundwater withdrawals are permitted in the basin.<sup>20</sup> If a large consumptive user (or users) transfer(s) a right, it might have significant impacts. Perhaps more important would be transfers along the smaller streams and creeks of the basin where consumptive rights might make up a larger proportion of in-stream flows. Transfers in these areas may have proportionally larger effects on fish habitat and therefore potential economic costs associated with reduced fish stocks, the risk of an “endangered” listing, etc. and will likely benefit from the creation of a water right for in-stream flows.

Conditioned water rights are required to cease use of river water based on their priority date. This involves significant administrative costs in determining the order that water rights should eliminate use during low flow conditions, contacting the users, delay in determining if flows are attained after initial actions and then subsequent contacts. Moreover, water rights have sometimes been conditioned on different flow levels making administration even more difficult. An in-stream flow right created by the rule will require that all junior rights eliminate use during periods when in-stream flows are not met, increasing the likelihood that in-stream flows and therefore ecosystem services are protected.

The rule also codifies the quantity of water available for allocations, maximum flows available for interruptible uses and open and closed periods. These were based on significant analysis of existing hydrology, biology, etc. Placing these values in rule will eliminate piecemeal management of water resources and help ensure that water is not over-appropriated in the future.

Waste assimilation services are also provided by the Stillaguamish River. Ecology regulates this service in rivers via National Pollutant Discharge Elimination System

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<sup>20</sup> Consumptive water right data from “Draft Stillaguamish River Watershed Temperature Total Maximum Daily Load,” 2003.

(NPDES) discharge permits. These allow discharge in designated mixing zones if certain water quality requirements are met. Ecology uses the 7-day, 10 year (7Q10) low flow as the design flow to consider when determining the requirements of these permits. They also consider other parameters such as temperature, oxygen levels, etc. In general, Ecology expects that reducing the quantity of water that would have been withdrawn will result in slight beneficial impacts to the 7Q10 flows and therefore pollution assimilation capacity, but that this will be unlikely to affect permit parameters.

### Recreation Benefits

Avoiding a reduction in flow caused by surface and groundwater uses in the rivers and streams of the Stillaguamish watershed could have several beneficial recreational effects. In general, more water in the river will favorably impact rafting, kayaking, canoeing, fishing, swimming, picnicking, camping and hiking. The exact magnitude is difficult to determine since the quality of the experience and the impact of additional flows are a function of many factors including existing flows, availability of other recreational opportunities, etc.

The Stillaguamish River is not extensively used for commercial rafting. Contact with rafting companies and the U.S. Forest Service indicates that outside of occasional special event rafting, little commercial rafting occurs. The Forest Service has not permitted any use on the north fork and only one kayak event during the 1980s on the south fork.<sup>21</sup> Anecdotal evidence indicates that informal rafting, tubing, kayaking and canoeing are more frequent river uses. These uses may benefit from increased in-stream flows if it increases the quality of the outdoor experience. However, offsetting this is a potential reduction in safety associated with lower flows. Unfortunately, no data exists as to the quantity and location of recreational trips on the river and so a quantitative result is not provided.<sup>22</sup>

Streamside and shoreline uses such as camping, picnicking, hiking or swimming could theoretically benefit from avoiding a decrease in flow in surface water bodies. Reduced flows can impact the visual experience of users and reduce the quality of the visit. However, the avoided reduction is likely to be moderate and it is unlikely to be a significant benefit.

Some recreational fishing does occur along the river. Steelhead catch rates are provided in Table 3.2 below.<sup>23</sup>

**Table 3.2. Stillaguamish River Catch Rates (5/01-4/02)**

<b>Fish Type</b>	<b>No. of Fish Caught</b>
Summer Steelhead	568
Winter Steelhead	1427

<sup>21</sup> Personal conversation with Phil Kincaire, USFS.

<sup>22</sup> Most local governments were contacted for data on recreational uses of the Stillaguamish, but none was available.

<sup>23</sup> Data from the Washington State Department of Fish and Wildlife Catch Report, 2002.

Unfortunately the data provides catch rates and does not discuss visitor-trip days making it difficult to analyze quantitatively.<sup>24</sup> However, such a small increase in flows in the river is unlikely to significantly alter the recreational fishing experience.

#### Availability of Water for Out-of-Stream Uses

##### (a.) Benefits to existing permits conditioned on in-stream flows

Existing holders of interruptible rights must curtail withdrawals when in-stream flows are not being met in the rivers and tributaries. To the extent that the rule decreases the rate of withdrawal of in-stream waters over time, this may reduce the frequency that existing rights will have to curtail use relative to the case with no rule. The exact benefit will depend on the location and quantity of avoided withdrawals and existing interruptible permits.

(b.) Increasing potential availability of water: Ecology is proposing to allow withdrawals during certain periods of the year from Canyon and Pilchuck creeks. These creeks are currently on the SWSL and recommended for permit denial. Opening these basins should result in a benefit to any proposed uses from these streams or groundwater in hydraulic continuity with the streams. However, the closures during certain periods of the year may limit the significance of this change.

Currently, there are 68 pending water right applications in WRIA 5. Thirty are groundwater applications and adoption of the rule may allow some of these to be approved. There are also 38 pending surface water right applications, of which at least 24 are for Lake Cavanaugh. These applications may now be allowed to move forward, with surface water withdrawals of 150 GPD from the lakes and ponds. The exact benefit attributable to the rule depends on what would happen to these permits without the rule. It is unclear in many cases if they would be approved or denied or simply held for future rulemaking activity. If these permits would be held for five or ten years absent the rule, then the benefit is the value of having the water available for use much sooner.

(c.) Stockwatering: The rule will make water available to water users engaged in this activity via a reservation. This includes surface rights and 20 acre-feet for uninterruptible groundwater rights. This should be a benefit to some users since current users would likely receive interruptible surface or groundwater rights for a given riparian area or be limited to exempt well use requirements.

(d.) Increased Certainty and Clarity in the Water Allocation Process: Increased certainty and clarity in water right acquisition should reduce the delay and uncertainty surrounding obtaining new water rights. This will allow developers and others to plan ahead in property development and better value investment opportunities. For example, it is likely that real estate valuations for raw land or those with pending applications around Lake Cavanaugh are affected by the uncertainty of whether water rights will be approved. The rule will make it clear how much water is available and under what conditions. This will allow the real estate markets to better assess the true valuation of individual properties. It

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<sup>24</sup> Moreover, it is important that these benefits are not double-counted since some of the benefits are provided by ecosystem services.



is likely that this is the case in many of the other pending applications also and perhaps more generally throughout the watershed.

*(e.) Improved Water Management Structure*

The rule includes provisions that will encourage local governments to jointly implement water management in the basin. This should lead to a less contentious and more holistic approach to water management and land use that will likely lead to long term benefits.

Setting in-stream flows should also reduce the amount of time staff spends in determining who should curtail use and how much and could potentially reduce permitting decision effort.

Risk, Uncertainty and Water Rights

There is significant uncertainty associated with water and in-stream flows. Decisions regarding permit applications for consumptive water withdrawals often involve uncertain impacts to ecosystems. The acquisition of future information may indicate that more or less water should be maintained in the river. Threatened species like the Chinook can further complicate water management. A National Research Council (NRC, 2004) report discusses the risk of species extinction and how small populations may be especially vulnerable to incremental changes in the environment.<sup>25</sup> The report notes;

*“Not enough is known about cumulative effects and threshold points....When considering the probable effects of incremental human activities, it is reasonable to assume that additional activity means additional risk, but we rarely know whether the relationship...is linear or whether there might be critical levels of activity above which the risk of extinction increases dramatically.”*

Seen in this light, even small changes may have large impacts that won't be known until after the fact. However, a water right is a firm commitment to provide water to a given user in perpetuity. By creating a reservation but limiting water use during low flows, closing certain streams during certain periods of the year and other requirements, Ecology is avoiding a reduction in flows which may reduce the risk to juvenile fish survival along with reducing the risk that Chinook will be listed as endangered under the ESA. An endangered listing would require significant responses from the community and government. Increasing the flexibility available to respond to subsequent information about potential water allocations can be considered a benefit of this rule.

Non-Use Values

Healthy rivers and supporting salmon have been shown to have large and positive non-use value. Salmon are a cultural and spiritual source of inspiration and people have demonstrated their willingness to pay for salmon restoration without ever consuming the fish or even visiting a site. These values are very difficult to quantify, however, it is reasonable to conclude that they would depend on the ecosystem impacts. As described previously, the ecosystem impacts may be significant if denying a proposed transfer

<sup>25</sup> Chinook salmon escapement is estimated to be between 1,000 and 1,500 (SLES, 2004).

avoids a significant reduction in fish habitat. Several of the papers listed in Appendix B include non-use values.

#### Public Health Benefits

Drilling holes in the ground associated with well construction has the potential to become a pathway for contaminants from the land surface to the aquifer below. Single family homes tend to be constructed in the most shallow aquifers further exposing them to contamination. In general, WSDOH has indicated that having many exempt wells increases the risk of contamination of groundwater supplies. The health effects of requiring connection of those proposed uses where service can be provided can be considered a benefit of this rulemaking. However, as mentioned previously, the number of potential water users this may affect is likely to be relatively limited and this is likely to be a relatively small benefit.

### CONCLUSIONS

As has been mentioned previously, many of the benefits and costs associated with the rulemaking are not quantifiable. This is due to the fact that the data is not available and/or the future is too difficult to predict. Often the analysis comes down to a tradeoff as to whether some uncertain number enlightens the analysis more than simply stating the result qualitatively. In the description of benefits and costs, information was presented that was intended to not necessarily provide a numerical point estimate, but to give some sense of scale. Conclusions were drawn regarding the magnitude of the impact based on that information. The costs of the rulemaking to out of stream uses including lake and pond consumptive withdrawal restrictions, stream closures, exempt well use restrictions, connection requirements and transfers are difficult to determine since the future number of permits, quantity withdrawn and location is difficult to know. Exempt well costs are potentially estimable and they were estimated to be between \$135,000 and \$1.7 million. The other costs would be added to that to obtain a total cost.

The benefits to ecosystem services, recreation, availability of water for out of stream uses, non-use and option values and public health benefits would have to be larger than this for probable benefits to exceed probable costs. Unfortunately, none of these values have been quantified. It appears the ecosystem benefits may be large. This is mostly due to the ability to evaluate transfers based on in-stream flows, improved management during low flow events and comprehensive planning. Absent the rule, Ecology would have no ability to restrict a large transfer that might have significant impacts on a stream or tributary that may provide spawning or rearing areas for fish. The current system of water management during low flow events involves identifying individual users that must curtail use based on priority dates. It is slow and expensive and delays the protection of the river during an important time. The establishment of in-stream flows will likely significantly reduce this problem. The planning involved in the rule development allows for a comprehensive approach to water allocations and codifying it in rule will likely reduce the likelihood that water becomes over-allocated. Non-use values may be correspondingly important since they are likely dependent on the avoided impacts to the ecosystem. Recreation benefits appear to be relatively small and public health benefits are also likely to be relatively small, since they will likely apply to a limited number of

potential well users. The remaining benefits include benefits to out-of-stream uses including stockwatering, pending water right applications, opening of some streams that would currently result in permit denial and improved certainty and clarity. Lastly, risk reduction and increased flexibility to respond to uncertainty should be a benefit.

Based on the analysis provided herein, Ecology believes the probable benefits associated with the rule exceed the probable costs.

The above analysis assumes the relevant cities and counties will provide the necessary written acknowledgment to the department that confirms that any legally required determinations of adequate potable water for building permits and subdivision approvals will be consistent with applicable provisions of this chapter. If they do not, and the reservation does not go into effect, all water uses will be interruptible. This will increase the cost of stream closures since even permit-exempt wells would be interruptible. It would also reduce the costs for implementation. The benefits to ecosystems, recreation, out-of-stream uses and non-use values and uncertainty will likely increase, but the public health benefits may decrease. Appendix C contains a further description.

## 4. LEAST BURDENSOME ANALYSIS

RCW 34.05.328 (1)(e) requires Ecology to perform a Least Burdensome Analysis to:

*“Determine, after considering alternative versions of the rule and the analysis required under (b), (c), and (d) of this subsection, that the rule being adopted is the least burdensome alternative for those required to comply with it that will achieve the general goals and specific objectives stated under (a) of this subsection.”*

The rule establishes an in-stream resources protection and water resources program for the Stillaguamish River Basin. One alternative for Ecology would have been to not initiate rulemaking. This would have left the existing water management structure in place as has been described in this document. However, in-stream flows would not be afforded the protection of a water right and exempt well users would be able to continue to use water during low flow periods. Moreover, further consumptive withdrawals would continue to impact the lakes and ponds of the watershed. Pending applications would likely be either denied or perhaps delayed even longer. Over time, rising water demand could eventually trigger fish habitat losses. Losses from an endangered species listing might have been large.

One alternative to the rule Ecology considered was completely eliminating water for outdoor uses from permit exempt well accessing water through the reservation. However, Ecology believes this may have significantly impacted households and businesses in the basin and did not meet the goals and objectives of the rulemaking. Ecology also considered a draft rule that would have limited outdoor uses to ornamental plants and small gardens. This would have allowed some outdoor watering, but would have eliminated the watering of lawns in the watershed. Again Ecology believes this would not meet the goals and objectives of the rulemaking. Therefore, Ecology elected to allow withdrawals for outdoor use from the reservation for outdoor watering on 1/12<sup>th</sup> of an acre. This will allow for individual consumers to determine how best to apply water to this land area.

The rule achieves the goals and specific objectives as stated in the rule at lowest cost given the above alternatives.

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# **APPENDIX A: EXISTING WATER MANAGEMENT, RULE IMPACTS & RULE ANALYSIS**

## **INTRODUCTION**

Ecology anticipates that a significant portion of the rule's implementation will be related to water rights and water management. Water rights and water management are governed by a series of statutes and court cases. Compliance with the rule will occur primarily within the context of complying with state water laws. Evaluating the impacts of the rule involves describing the baseline from which the change caused by the rule is measured. The baseline includes water right administration for both new and changes of water right applications under chapters 90.03 and 90.44 RCW and case law. It also includes the use and development of water by permit exempt wells pursuant to RCW 90.44.050. For the consideration of in-stream values, chapter 77.55 RCW and current implementation of chapter 90.22 and 90.54 RCW as they relate to water rights and water management is also part of the baseline.

In proposing the creation of the reservations of water, and establishing in-stream flows, the rule creates a mechanism that allows for future uninterrupted domestic water uses and stockwatering. In the case of the stream closures, the rule's effect will likely be on future determinations of water availability. Consideration of water availability is part of the water right application process. The four-part test for a water right from RCW 90.03.290 remains unchanged and includes examination of water availability. The rule will quantify water availability for some uses through the reservation and establish new water rights for this watershed. Conditions may be imposed on a future water right to implement the rule. How the rule changes consideration of requests for new water and or changes to water rights and in particular how environmental values are reflected in the decisions prior to and after the rule are described below.

## **BASELINE DEVELOPMENT**

Under State water law, the waters of Washington belong to the public and cannot be owned by any one individual or group. Proposed diversion of any amount of water for any use from all surface or groundwater sources requires a water right. A water right is a legal authorization to use a certain amount of public water for a designated purpose. A water right is also necessary if you plan to withdraw more than 5000 gallons of ground water.

An application for a ground water right permit is not required if your daily ground water use from a well or wells will be 5,000 gallons a day or less for any of the following combinations of uses:<sup>26</sup>

- Stock-watering.

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<sup>26</sup> Publication #F-WR-92-104.

- Single or group domestic purposes such as drinking, cooking and washing.
- Industrial purposes.
- Watering a lawn or noncommercial garden that is a half acre or less in size.

Although the law allows an exemption from the water right permit process in these cases, all other water laws and regulations still apply to these uses.

Washington water law requires users of public water to receive approval from the state prior to the actual use of water. Approval to put water to beneficial use is granted in the form of a water right permit. The proposed use must meet four primary requirements (known as the “four-part test”) in order for Ecology to issue a water right permit:

1. The water will be put to beneficial use;
2. There will be no impairment to existing rights;
3. Water is available; and
4. The water use will not be detrimental to public welfare.

Ecology conducts an investigation of the application to confirm the information on the application and applies the four-part test mentioned above. In applying this four-part test, some of the facts Ecology considers are based on the particular water source, existing water rights, and watershed. These include the in-stream flow recommendations made in the past, in-stream flow rules (if they exist) and whether and how groundwater is connected to surface water sources. The results of the investigation and four-part test review are summarized in a report of examination (ROE). The ROE contains Ecology's staff-level decision on a water right request. Ecology can recommend a denial, an approval, or an approval with conditions. Once approved by an Ecology decision-maker, Ecology issues a final ROE and orders approving the ROE. If approved, the permit will likely have specific conditions.

In-stream flow considerations within water right application administration has been the law since 1949 (See RCW 77.55.050). Generally, a flow of water sufficient to support game fish and food fish populations must be maintained at all times in the streams of this state. Under that statute, Ecology sends copies of water right applications to the Washington Department of Fish and Wildlife (WDFW) to see if approving the proposed withdrawal would compromise game and food fish populations. In 1969, by adoption of Chapter 90.22 RCW (Minimum Water Flows and Levels) and again in 1971, by adoption of the Water Resources Act, the Legislature added additional policies for in-stream flow considerations and the in-stream flow rule program. In-stream flows once adopted by rule are water rights protected from impairment from those rights junior in priority date to the in-stream flows (RCW 90.03.345). Ecology is prohibited, by statute, from allowing withdrawals of water that conflict with an in-stream flow regulation, unless there is a clear showing of overriding consideration of public interest (RCW 90.54.020(3)(a)). Numerous water sources in WRIA 5, about 30% of the basin, are listed on Ecology's Surface Water Source Limitation List (SWSL) based on past comments of resource agencies pursuant to RCW 77.55.050.

The consideration of a proposed withdrawal's impact on fisheries resources and flow is performed by professional fisheries biologists based on professional judgment using the existing data and/or knowledge of the basin. If there is concern that approval of use might compromise in-stream values, an application can either be denied or approved with use conditioned on minimum flow levels. A junior water right must stop use, if a senior right is not satisfied. Consequently, rights conditioned upon minimum flow levels are interruptible water rights that must be discontinued during times when streamflows are below the established flow value. In the case of the Stillaguamish River, there is no existing in-stream flow rule in place and water is currently allocated according to existing water law. The current water management program can be broken down as follows:

#### Surface Water Allocations (water right permit)

New applications for surface water rights are forwarded to the WDFW for review and comment. The four-part test is applied. If there is a concern that water uses might adversely impact fish, WDFW will recommend that the right not be issued or that any use granted be conditioned on minimum flows. In most cases Ecology will accept WDFW's recommendation and condition the right in such a way that flows are protected. A permit is approved granting an interruptible right.

#### Groundwater Allocations (water right permit)

New applications for ground water rights are, generally, subject to the same requirements as for surface water rights. All applications are reviewed by WDFW. The four-part test is applied. If there is a concern that water uses might adversely impact fish, for example due to hydraulic continuity, WDFW will recommend that the right not be issued or that any use granted be conditioned on minimum flows. In most cases, Ecology will accept WDFW's recommendation and condition the right in such a way that flows are protected. The impact of a ground water withdrawal on a surface water body (stream or lake) through hydraulic continuity is generally estimated based on aquifer characteristics and accepted hydrogeologic study methods.

Historically few approved ground water uses were issued interruptible with a condition on in-stream flows. After the 1980's that practice changed. The science of ground water development and tools for assessing ground water flow became more advanced. Moreover, Ecology's understanding of the law on ground water hydraulic continuity was shaped, in part, by the Supreme Court's decision in *Postema v. Ecology* (2000). Now a ground water development's impact to existing wells and surface water sources is evaluated within the impairment analysis.

#### Groundwater Allocations (permit exempt)

New ground water can be obtained from permit-exempt wells under specific conditions (RCW 90.44.050). The groundwater permit exemption is an exemption from a water right permit application; all other water laws and regulations still apply. Currently, the local health district and building permit officials determine when permit exempt wells can be used. In general, there are few restrictions on location except for sanitary setbacks.



As a water right, use of a permit exempt well can be regulated in favor of senior rights if it impairs an existing right, including in-stream flows. Historically, Ecology has rarely regulated these water rights to protect senior water rights.

#### Changes or Transfers of Water Rights (Water Right Permits)

Existing water rights can be changed or transferred pursuant to chapters 90.03 and 90.44 RCW.

#### Reservations of water

There is no existing reservation of water within WRIA 5.

#### Closures of water sources in WRIA 5

There are currently several streams listed on Ecology's SWSL list that would either be denied or conditioned on low flows in WRIA 5. Closures are based on a finding of no water availability, generally because the available supply has been fully allocated.

### **RULE IMPACTS TO WATER RIGHT ADMINISTRATION**

The future water right management program under the rule can be broken down as follows:

#### Surface Water Allocations (water right permit)

Before Ecology can approve a water right application for a new public water system, the applicant must provide sufficient documentation that no water is available from a municipal water supplier; otherwise Ecology must reject the water right application.

New applications for surface water rights will still be forwarded to the WDFW for review and comment and the four-part test will be applied. In cases where the proposed withdrawals may impact in-stream needs, WDFW will recommend that the right not be issued or that any use granted be conditioned on the rule's minimum flows. In most cases Ecology will accept WDFW's recommendation and condition the right in such a way that flows are protected.

Under the rule, all new water rights will be "junior" to the published instream flow values and be required to stop withdrawals when minimum flows are not met in the surface water source. In general, this is not likely to represent a significant change for future proposed surface water withdrawals because prior to this rule, the water right applications were evaluated by WDFW for in-stream flow considerations and usually conditioned. Applications for new surface water rights from closed sources would be denied, unless the applicant proposed mitigation of the water use or the use was approved subject to overriding considerations of the public interest. For those areas currently closed (on the SWSL), this would represent no change from the current situation. For areas that are not currently closed, this may represent a change. The rule will ensure uniformity and consistency in flow determinations and resultant in-stream flow provisos.

The rule will close all lakes to consumptive water use, except for single domestic supply. For single domestic supply, in-house use of only 150 gpd will be allowed.

Groundwater Allocations (water right permits)

Before Ecology can approve a water right application for a new public water system, the applicant must provide sufficient documentation that no water is available from a municipal water supplier; otherwise Ecology must reject the water right application.

New applications for ground water rights are, generally, subject to the same requirements as surface water rights. The four-part test is applied. All applications will still be reviewed by WDFW and if there is a concern that water uses might adversely impact fish, WDFW will recommend that the right be so conditioned as to provided for in the in-stream flow rule. In most cases, Ecology will accept WDFW's recommendation and condition the right in such a way that flows are protected. The impact of a ground water withdrawal on a surface water body (stream or lake) through hydraulic continuity will generally still be estimated based on aquifer characteristics and accepted hydrogeologic study methods. If the proposed appropriation were to capture water, that would otherwise contribute to in-stream flows, the permit approval would be conditioned as interruptible to protect against impairment of the in-stream flow right.

Applications for new ground water rights from closed sources would be denied, unless the applicant proposed mitigation of the water use or the use was approved subject to over riding considerations of the public interest. For those areas currently closed, this would represent no change from the current situation. However, for areas that are not currently closed, this may represent a change since new ground water rights would be denied, unless the applicant proposed mitigation of the water use or the use was approved subject to over riding considerations of the public interest.

As mentioned above, groundwater rights are subject to the same requirements as for surface water rights. However, in the past, groundwater rights have not been conditioned due to the difficulty in knowing impacts to surface sources based on the degree of continuity. The rule clarifies the applicant's responsibility in demonstrating that groundwater extraction will not impair other rights. However, the impact created on the surface water source via hydraulic continuity is not necessarily impairment. A separate statutory requirement exists to analyze the possibility of impairment from withdrawals of ground and surface waters in continuity. This rule does not affect this statutory requirement.

Groundwater Allocations (permit exempt)

Some portions of the Stillaguamish basin are closed to new ground water development during some periods of the year under the rule, with exceptions provided for in the rule. The reservation of permit-exempt ground water for future domestic, small business, and municipal water supplier uses will provide for a management framework for these types of withdrawals. Because access to the reservations requires local governments to take certain steps, one of the most significant factors influencing impacts from the rule is whether the local governments submit a written acknowledgment to the department that confirms that any legally required determinations of adequate potable water for building

permits and subdivision approvals will be consistent with applicable provisions of this chapter. If an acknowledgement is not provided by local governments, then no reservation water is available. The analysis below assumes that local governments provide this.

If there is no reservation in effect, and certain streams or basins are closed to new appropriation, then no new permit exempt wells would be drilled in those areas. If the reservation is in effect, and water is being used, there are still several water management conditions that may have an impact on water use including restrictions on outdoor use.

For individuals and business entities, there are several alternatives. Applicants may choose as a first order of business to solicit a hydrogeologist to certify that a well would not cause an impairment of a water right in those areas where hydraulic continuity is unlikely. This would allow an applicant to develop a well without the limitations imposed by the existing rule's instream flows and without the limitations imposed by the rule. However, the applicant would bear the additional cost of the analysis. For some wells in basins that drain groundwater to saltwater bodies, the cost for hydrogeologic consultation would likely be very small. For those applicants wishing to use water in areas with a likelihood of hydraulic continuity and consequently, impairment of instream flows, they could get water from the reservation or accept an interruptible water right.

Applicants can obtain water from the reservation if it is not available from a municipal water supplier.

#### Changes or Transfers of Water Rights

Existing water rights can continue to be changed or transferred pursuant to chapters 90.03 and 90.44 RCW. Changes to surface water rights and transfers of point of diversion downstream or upstream on a source will now include consideration and potential restrictions due to the in-stream flow right. Changes in point of diversions from a surface point to a ground water point from the same water source will probably not be impacted by the rule.

#### Reservations of water

The reservation of water, use of the 5 CFS of water under the reservation and associated conditions for that use are all new proposals. In large measure, the reservation will allow use of permit-exempt wells without them being subject to the instream flow right. These uses are subject to limitations on outdoor watering and other conditions. Use of water under the domestic use reservation is conditioned as follows:

(2) Use of water under the reservation is available only if all the conditions set forth in this section are fully complied with. Conditions for use of the reservation water are:

(a) The reserved water shall be for ground water uses exempt from a water right permit application. This reservation is for either single or small group domestic uses, as defined in WAC 173-505-030(5).

(b) This reservation of ground water shall not exceed 3.23 million gallons of water per day (5 cfs).

(c) Domestic water use shall meet the water use efficiency standards of the uniform plumbing code as well as any applicable local or state requirements for conservation standards.

(d) The reservation shall be applicable only when the appropriate city(ies) or counties submit a written acknowledgement to the department that confirms that any legally required determinations of adequate potable water for building permits and subdivision approvals will be consistent with applicable provisions of this chapter.

Once this chapter is adopted and written acknowledgement is received, the department will promptly notify those city(ies) or counties, the Tribes, water well contractors and the public that the reserve is in effect in those jurisdictions where acknowledgements exist.

(e) It shall be the responsibility of an applicant for a building permit or subdivision approval seeking water under the reservation to comply with the conditions in (a), (b), (c), (e), (f), (g) and (h) of this subsection and all other conditions of this chapter.

(f) A new ground water withdrawal under the reservation is not allowed in areas where a municipal water supply has been established and a connection can be provided by the municipal supplier. If an applicant for a building permit or subdivision approval cannot obtain water through a municipal supplier, the applicant must obtain a letter from a municipal supplier prior to drilling a well which states that service was denied. Such a denial shall be consistent with the criteria listed in RCW 43.20.260.

(g) Outdoor water use is limited to the watering of an outdoor area not to exceed a total of 1/12th of an acre for all outdoor uses under each individual domestic water use. Under all circumstances, total outdoor watering for multiple residences under the permit exemption (RCW 90.44.050) shall not exceed one-half acre.

(h) The department reserves the right to require metering and reporting of water use for single domestic users, if more accurate water use data is needed for management of the reservation and water resources in the area of the reservation. All other ground water users under the permit-exemption shall be required to install and maintain measuring devices, in accordance with specifications provided by the department, and report the data to the department.

When the rule goes into effect, then use of the permit-exempt well water will be obtained from a reservation if year-around use is desired. Applicants that elect to install permit exempt wells for their own moderate needs or to develop saleable land will have more choices as to their best option. Under the rule, the project proponent may choose other methods of water well development (for example drilling to deep aquifers) to meet their needs and avoid limitations imposed by the rule.

The rule also proposes a future stock watering reservation for stock water as directed by RCW 90.22.040. Future stock watering in the rule is accessed via either a diversion structure or wells and relates to normal grazing activities for the surface water use. In addition, RCW 90.44.050 provides an exception to the requirements for a ground water right permit for stockwater. The rule sets a 20 acre foot volume limit for ground water in this use but otherwise does not change the existing situation.

### Closures of Water Sources in WRIA 5

The rule will include most of the current limitations on water withdrawals based upon the SWSL list but also adds to them. Ecology anticipates denying applications from closed sources unless the applicant can mitigate for the impacts or they can accept an interruptible right. Denial or conditioning on low flows was true before the rule, but after the rule becomes effective the areas subject to closure will enlarge.

### Maximum Allocation

There is also a maximum allocation for those periods of the year that the streams and rivers will be open.

## **PROPOSED RULE (CHAPTER 173-505 WAC)**

The complete rule language for “In-stream Resources Protection and Water Resources Program-Stillaguamish River Basin Water Resources Inventory (WRIA) 5” can be found in Chapter 173-505 WAC. The following provides a brief description of the rule and a further discussion of those specific rule provisions that may impact in-stream flows and/or out-of-stream uses of water.

### Chapter 173-505-010 General Provisions-Authority and Applicability

This rule is promulgated pursuant to chapter 90.54 RCW (Water Resources Act of 1971), chapter 90.22 RCW (Minimum Water Flows and Levels), and chapters 18.104, 90.42 and 90.44 RCW along with chapter 173-500 WAC (Water Resources Management Program). The rule applies to all future uses of surface water and groundwater hydraulically connected to those surface waters within the Stillaguamish River Basin, also known as Water Resources Inventory Area (WRIA) 5.

*Conclusion: No significant economic impact.*

### Chapter 173-505-020 Purpose

The purpose of the rule is to retain perennial rivers, streams and lakes within the Stillaguamish River basin to protect and preserve in-stream values, to create a reservation and to set forth the department’s policies.

*Conclusion: No significant economic impact.*

### Chapter 173-505-030 Definitions

See the rule.

*Conclusion: No significant economic impact.*

### Chapter 173-505-040 Establishment of Stream Management Units

This section defines control points and the location of the stream management units for the mainstem and north and south forks of the Stillaguamish River and other tributaries.

*Conclusion: No significant economic impact.*

#### Chapter 173-505-050 In-stream Flows

This section establishes the specific minimum in-stream flows required for WRIA 5. The flows will be water rights with a priority date of the rule and will be measured on a bi-weekly or monthly basis for specific control points. These flow standards will be the basis for determining when in-stream flow levels are not being attained and when junior water users (whose use influences flows) will be required to reduce or curtail use. All water rights granted after in-stream flows are established will be considered “junior” to the specified in-stream flows.

The rule will apply to all waters within the Stillaguamish River basin (WRIA 5). Specific in-stream flow standards are set for the Stillaguamish River mainstem, the north and south forks of the Stillaguamish and many tributaries. Minimum flows are also set for several small streams.

*Conclusion: Setting minimum instream flows may have significant economic effects-See “Rule Impacts to Water Right Administration.”*

#### Chapter 173-505-060 Lakes and Ponds

The rule will limit use of water from all lakes and ponds to single in-house domestic uses not to exceed one hundred and fifty gallons per day per home.

*Conclusion: Restrictions on use have significant economic effects-See “Rule Impacts to Water Right Administration.”*

#### Chapter 173-505-070 Stream Closures

The rule will close all streams and tributaries in the basin to new consumptive uses except for some periods of the year. Watershed areas contributing groundwater to these areas are also closed to new consumptive water withdrawals. All unappropriated water is to be appropriated for protecting and preserving in-stream values. Some water is available for appropriations during some periods of the year.

*Conclusion: Closing the streams and rivers could have impacts on future water users which may have significant economic effects, but exceptions may limit the impacts-See “Rule Impacts to Water Right Administration.”*

#### Chapter 173-505-080 Future Stock Watering

Ecology will reserve surface water and 20 acre-feet of groundwater for future stock watering in the rule accessed via either diversion structures or wells and related to normal grazing activities.

*Conclusion: Reservation size was set to meet all future riparian stockwatering areas and access will be allowed essentially the same as before the rule. Surface water users will be able to get an uninterrupted right. Groundwater users will likely not be substantially affected. Significant economic impact may occur- See “Rule Impacts to Water Right Administration.”*

#### 173-505-090 Reservation of Permit-Exempt Ground Water for Future Domestic Uses

The rule provides for establishment of a reservation of water for domestic uses including the human health requirements of businesses on a year round basis. This would include a maximum allocation of 2 CFS in the north fork and 1.5 CFS in the south fork subject to several conditions. A total allocation of 5 CFS is available. This water shall be reserved for single or small group domestic uses exempt from a water right permit application.

Efficiency standards for the reservation will require that water use meet the Uniform Plumbing Code and local conservation standards, and that the local governments submit a written acknowledgment to the department that confirms that any legally required determinations of adequate potable water for building permits and subdivision approvals will be consistent with applicable provisions of this chapter. Use of the reservation will not be allowed if water can be provided by a municipal water supplier. Outdoor watering will be limited to an amount for 1/12<sup>th</sup> of an acre for each individual domestic use for all outdoor uses. Specific accounting criteria for use of reservation water are included.

*Conclusion: Requirements for connection and restrictions on use are likely to have an economic impact. The requirement that local governments submit a letter of acknowledgement prior to the reservation being established may delay or pre-empt reservation establishment. See "Rule Impacts to Water Right Administration."*

#### Chapter 173-505-100 Maximum Allocation

A maximum allocation from certain rivers and streams is included for those periods of the year that the streams and rivers will be open. This will apply to the mainstem, north and south forks and Pilchuck, Squire, and Canyon Creek.

*Conclusion: This is unlikely to be a limit on future development in the basin. No significant economic impact is anticipated.*

#### Chapter 173-505-110 Future Permitting Actions

Applicants must demonstrate that any available municipal water suppliers cannot provide water. If it is available, permits will be denied. Future water availability will be very limited and un-restricted use will only be allowed during closed periods if the proposed use is non-consumptive, the source not in continuity, the use mitigated or the applicant proposes storage. Some salmon recovery projects may be approved. Mitigation is encouraged and will be evaluated on a case by case basis. All future surface and groundwater permit holders will be required to provide measurement devices and report the use data.

*Conclusion: Some potential impacts to future water right applicants. Metering requirements are not a change from current requirements. See "Rule Impacts to Water Right Administration."*

#### 173-505-120 Alternative Sources of Water

The department encourages the use of alternative sources of water. These may be important as potential mitigating projects when a water use is proposed.

*Conclusion: No significant economic impact.*

173-505-130 Establishment of Trust Water Rights Program

A trust water rights program will be established to facilitate the acquisition of water rights. No additional program set-up costs are anticipated.

*Conclusion: No significant economic impact.*

173-505-140 Future Changes and Transfers

Transfers will only be allowed if they don't conflict with this chapter

*Conclusion: This may restrict transfers that would have occurred absent the rule. This may have a potentially significant economic impact. See "Rule Impacts to Water Right Administration."*

173-505-150 Compliance and Enforcement

To obtain compliance, the department shall produce and distribute technical and educational material. The department will first attempt to get voluntary compliance.

*Conclusion: Preparation of educational materials will involve costs.*

173-505-160 Appeals

All decisions can be appealed to the pollution control hearings board

*Conclusion: No significant impact*

173-505-170 Regulation Review

This rule may be reviewed and revised.

*Conclusion: No significant impact*

173-505-180 Maps

*Conclusion: No significant impact*



## **APPENDIX B: PREVIOUS RESEARCH**

Determining the value of in-stream flows has been considered in several previous academic papers. The results indicate a fairly wide range of estimates, but this is to be expected since the value of additional water in rivers is a function of the existing flow levels, river development, recreational opportunities, other recreational opportunities, fish availability, location on the river, etc. Moreover, the analysis is made difficult since in-stream flows have public goods characteristics and the value is not revealed in markets. The studies cited below are intended to provide a sense of valuations obtained in other areas. No studies specific to the Stillaguamish River were carried out as part of this analysis.

Loomis (1987) provides an overview of the economic theory and early analyses of in-stream flows. He discusses market and simulated methodologies for determining the value of in-stream flows. The values cited in the paper range from \$15.75 to \$74.00 acre-ft/day.

Johnson & Adams (1988) analyzed the John Day River in north central Oregon. They evaluated the benefits of flow on steelhead and the study is unique in that it quantified the relationship between streamflow and fishery productivity and used non-market valuation techniques to consider the economic benefits of changes in fishing quality. They found the value of summer flow to be \$2.36 per acre-ft over the three month summer period.

Loomis and Cooper (1990) considered the value of in-stream flows for recreational fishing along the Feather River in northern California. They use a flow-fish model and link it to a travel cost model to determine the value of increased flows. They find that a 20% increase in flow is worth about \$72.90 per cfs for this specific location.

Duffield, Neher and Brown (1992) estimated the recreation benefits of in-stream flow along Montana's Big-Hole and Bitterroot rivers. They found a marginal recreational value from in-stream flows of approximately \$50 per acre foot plus \$25 per acre foot for downstream hydroelectric generation.

Berrens, Ganderton and Silva (1996) estimated the benefits of in-stream flow used for protection of endangered species for households in New Mexico. They found that the estimates ranged from \$28.73 to \$89.68 for households in New Mexico.

A summary of the analyses is provided in table B.1.

**Table B.1. Empirical Estimates of the Value of In-stream Flow**

<b>Authors</b>	<b>Estimate</b>	<b>Estimate<sup>27</sup></b>
Loomis (1987)	\$15.75-\$74.00 ac-ft/day	\$0.15-\$0.69 ac-ft/summer
Johnson & Adams (1988)	\$2.36 ac-ft/summer (1987\$)	\$2.36 ac-ft/summer
Loomis & Cooper (1990)	\$72.90/cfs/summer	\$3,926.9 ac-ft/summer

<sup>27</sup> This column reflects the paper's original estimate but re-calculates it assuming a 107 day summer season.

Duffield, Neher and Brown (1992)	\$50 ac-ft	
Berrens, Ganderton and Silva (1996)	\$28.73 to \$89.68 per household	N/A

As can be seen, the values vary a lot based on the type of analysis, specific river, etc. Several of the studies give values in acre-feet/year that are smaller than the costs calculated above in acre-ft/year.

## **APPENDIX C: ESTIMATED ECONOMIC IMPACTS OF WATER USE RESTRICTIONS**

To quantify some of the economic impacts of the rule, a model was built to evaluate some of the water use restrictions. It considers demand for water and models a quantitative limitation on water use by determining how much the price of water would have to increase to obtain the same water use as that imposed by the rule's quantitative limitation. Surface and groundwater users are modeled as if they were connected to a public water system and required to pay for the quantity of water used. If the price of the water were raised, it would be expected that some reduction in water use would occur. The price that yields the maximum water use allowed in the rule can be calculated and the difference used as a measure of economic impact. For determining the cost impacts of water use, the Snohomish County PUD's prices were utilized. As for most water utilities, water rates are composed of two parts; a flat fee for a base charge and a unit price for use. For this analysis, the relevant price paid in the unit price since the base rate would have to be paid every month for indoor use. In Snohomish County, the unit cost of water is \$1.53 per hundred cubic feet (CCF).

Water use in Washington varies based on many factors including location, type of conservation, fixtures, etc. The United States Geological Survey (USGS) has done a significant amount of analysis on water use in Washington and found that for the two counties of interest, the results are as listed in Table C.1.

**Table C.1. Average per Capita Water Use in Snohomish and Skagit Counties**

	<b>Self-Supplied</b>		<b>Total Domestic</b>	
	<b>Population (Thousands)</b>	<b>Per capita use (gal/d)</b>	<b>Population (thousands)</b>	<b>Per capita use (gal/d)</b>
<b>Snohomish County</b>	103.0	102.9	606.0	100.0
<b>Skagit County</b>	33.9	124.8	103.0	124.0

These values are average values for existing uses. To the extent that new construction may contain more efficient fixtures, it may be an overestimate of use.

Given household size data, the above data can be used to determine average household use in rural areas. Since the new uses to be considered will be part of the self-supplied category, it is likely that these per capita use numbers are more appropriate to use. The results are described in Table C.2.

**Table C.2. Estimated Average Self-Supplied Household Water Use in Snohomish and Skagit Counties**

	<b>Typical Household Size (No. persons)</b>	<b>Avg. Household Daily Use (gal/d)</b>	<b>Avg. Household Annual Use (gal/yr)</b>
<b>Snohomish County</b>	2.54	261.4	95,411
<b>Skagit County</b>	2.55	318.2	116,143

The results in Table C.2 are within the range of published estimates of household use.<sup>28</sup>

The next step is determining how much of the annual use is outdoor water use that would be expected if no rule is in effect. Little data exists on residential end-uses, but outdoor water use likely varies a lot within the State based on differences in precipitation, temperature, evapotranspiration and land use and topography. One study that did consider end-use is the American Water Works Association (AWWA, 1999) that performed an evaluation of end uses at several locations throughout the nation and determined average in-house and out-of-house uses.<sup>29</sup> They found that on average, nationwide per capita indoor water use is approximately 69.3 gallons per day with a range of 57.1 to 83.5 gallons per day for the twelve study sites considered. The average indoor water use for Seattle was 57.1 gallons per capita per day. Using the average indoor use rate yields the estimated indoor and outdoor uses listed in Table C.3.

**Table C.3. Estimated Indoor and Outdoor Water Use**

	<b>Average Annual Household Use (gal/yr)</b>	<b>Average Annual Household Indoor Use (gal/yr)<sup>30</sup></b>	<b>Average Annual Household Outdoor Use (gal/yr)</b>	<b>Average Annual Household Outdoor Use (CCF/year)</b>
<b>Snohomish County</b>	95,411	64,248	31,163	41.8
<b>Skagit County</b>	116,143	64,501	51,642	69.2

As can be determined, the estimated amount of water used outdoors ranges between 31,163 gallons/year (41.8 CCF/yr) and 51,642 gallons per year (69.2 CCF/yr). Annual household outdoor use in the AWWA study ranged from 7,800 gallons per year to 213,000 gallons per year with an average in Seattle of 21,700 gallons per year. As can be seen, the values listed are significantly larger than the average for Seattle. But outdoor uses in Seattle also involve smaller lot sizes than is typically the case in the rural areas of the counties.

There are two different requirements in the rule that we can evaluate using the above analysis. The first is the proposal in the rule to limit withdrawals from lakes and ponds to 150 gallons per day per household. From Table C.3, average household indoor use in the counties can be estimated to be approximately 176 gallons per day. This is more than allowed in the rule. However, the results from the AWWA study indicate that typical indoor use in the Seattle area is 57.1 gallons per day or 146 gallons per day. This is likely the result of high efficiency fixtures and education and could likely be achieved in new construction along lakes and ponds. Therefore, it appears that indoor water requirements can be met.

<sup>28</sup> (AWWA, 1999) found use values ranging from 69,900 gallons per year per household to 301,100 gallons per year per household.

<sup>29</sup> "Residential End Uses of Water", AWWA, 1999.

<sup>30</sup> Calculation uses household size for each county, and average indoor use value of 69.3 gallons per capita per day.

Outdoor uses will be restricted however. As noted in Table C.3, outdoor water needs are estimated to average between 31,200 and 51,700 gallons per year and for lots adjacent to lakes and ponds, there will not likely be any water available for outdoor uses. However, the volumes noted above might be overestimates for lots abutting lakes and ponds since lakeside lots tend to be smaller than an average rural county parcel. To determine the price change that would lead to the equivalent reduction in quantity consumed, a measure of the sensitivity of individuals to price changes is required. This is provided in the concept of “elasticity.” Elasticity is the percentage change in quantity demanded divided by the percentage change in price. For example, an elasticity of -1.0 indicates that quantity consumed falls by 1% for a 1% increase in price. To estimate this quantity, elasticity estimates for demand curves from previous research were used.<sup>31</sup> Elasticities for water tend to be quite low which is not surprising for a “necessity” like water ranging from -0.1 to -1.57 depending on the use, time period, etc. However, the elasticity of demand for water for outdoor use is likely to be higher reflecting the lower valued use. AWWA directly evaluated the elasticity of outdoor water use and found the value to be -0.82 which is consistent with the belief that outdoor uses are more discretionary than indoor uses and is the value utilized here. Given the initial price of water, the use estimates and elasticity measure, the cost impact to surface water users of lakes and ponds is estimated to be in the range of \$58 and \$244 dollars per year.

The second restriction on water use will impact those that access the reservation through use of exempt wells. The rule will limit water use to an area of 3,630 square feet. Adding the square footage of a typical house footprint yields a lot size of approximately 5,000 square feet. This is the typical size of lots located in the City of Seattle and so the outdoor use numbers found in the AWWA study for the City of Seattle were used as an estimate of the outdoor water needs for the area allowed to be watered in the rule. As was noted above, the AWWA study found that residents of Seattle and environs used approximately 21,700 gallons per year for outdoor uses. Using the data above, the average difference between average desired use and that allowed by rule can be calculated and ranges from 9,463 and 29,942 gallons per year. Given the above values for use, price and elasticity, the price that would be required for users to voluntarily restrict their water use to an area of 3,360 square feet was determined and the values calculated were between \$3 and \$35 per year.

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<sup>31</sup> See AWWA (1999) and Baumann, Boland and Hanemann (1998).